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Castors and wheels — Requirements for castors for swivel chairs

Roues et roulettes — Exigences pour roulettes pour sièges de bureaux

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22880 was prepared by Technical Committee ISO/TC 110, *Industrial trucks*, Subcommittee SC 3, *Castors and wheels*.

Castors and wheels — Requirements for castors for swivel chairs

1 Scope

This International Standard specifies the technical requirements, the appropriate dimensions and the requirements for testing of castors, with or without braking devices, that will normally be used on swivel chairs.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 22877, *Castors and wheels — Vocabulary, symbols and multilingual terminology*

ISO 22878:2004, *Castors and wheels — Test methods and apparatus*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22877 apply. Symbols are given in ISO 22878:2004, Annex A.

4 Dimensions and classification

4.1 Characteristics

The characteristics of a castor are

— fixing system,

— castor type, and

— dimensions.

4.2 Fixing system

The fixing system includes the stem and circlip, threaded stem and other fixing systems.

4.3 Castor type

4.3.1 General

Castors are classified into four types (H, W, C and U). These all apply to the castor designs illustrated in Figures 1 and 2.

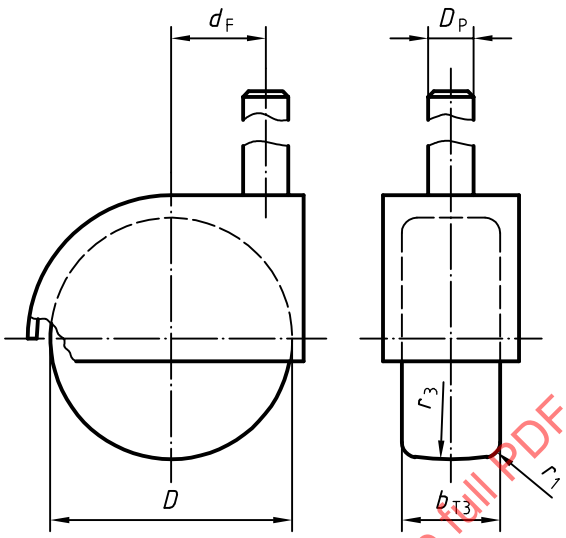

Figure 1 — Single-wheel swivel castor

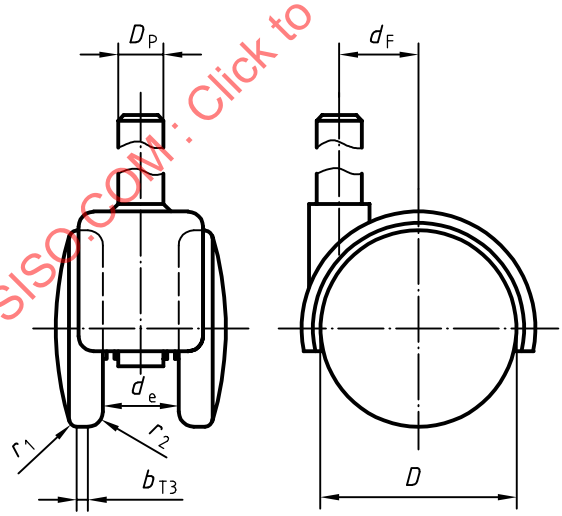

Figure 2 — Twin-wheel castor

4.3.2 Type H

Castors with plain wheels are defined as Type H, hard tread. The wheel shall be one colour over the entire surface.

These castors are suitable for carpeted floors.

4.3.3 Type W

Castors with resilient tyred wheels are defined as Type W, soft tread. The tread shall be of a clearly different colour from the wheel centre.

These castors are suitable for hard stone, wooden or tiled floors, or those featuring non-textiled covering.

4.3.4 Type C

These castors are antistatic or electrically conductive.

These castors should have either Type H or Type W wheels. They may also conform to Type U.

4.3.5 Type U

These castors are for swivel chairs with a built-in braking mechanism.

The castors should have either Type H or Type W wheels. They may also conform to Type C.

NOTE 1 For certain applications, castors for swivel chairs require a built-in braking mechanism that is released when a person sits on the chair to which the castors are fitted, allowing ease of mobility in that position. This braking action is automatically re-applied as the person leaves the chair to prevent the chair rolling away unintentionally.

NOTE 2 The decision regarding the type of castors to be fitted to swivel chairs depends on the chair design and the type of floors and covering in use.

Castors with permanent braking systems are not acceptable.

4.4 Dimensions

Figures 1 and 2 show typical castor designs. Table 1 shows the specified dimensions and the corresponding symbols.

Table 1

Dimensions in millimetres

Description	Castor designs	Symbol	Dimension
Wheel diameter	all	D	min. 48
Offset	all	d_F	min. 18
Tread width	single wheel	b_{T3}	min. 18
	twin wheel		min. 2 × 7
External corner radius	all Type H	r_1	min. 6
	all Type W		min. 1,5
Internal corner radius	all twin wheel	r_2	min. 1,5
Tread curvature	all single wheel	r_3	min. 110
Wheel spacing	all twin wheel	d_e	15 to 22
Minimum stem diameter	all	D_P	10 mm or M10

5 Requirements for testing

5.1 General

Test methods and apparatus shall be as specified in ISO 22878.

The test values detailed are the minimum required for acceptance.

5.2 Standard conditions

5.2.1 Environmental conditions

Tests shall be carried out at a temperature between 17 °C and 23 °C. During the 24 h prior to the test, the samples shall remain at the specified temperature, in an environment with a relative humidity between 40 % and 70 %.

Samples shall not be artificially cooled during testing.

5.2.2 Test sequence

Tests on electrical resistance, impact, contact pressure, stem retention and static load shall all be carried out with new castors each time.

Another new castor is then taken and the remaining tests shall be carried out in the sequence shown in Table 2.

Table 2

Reference in this International Standard	Test sequence	Castor types	Test procedure given in ISO 22878:2004, subclause
5.3	Impact performance	all	**4.12**
5.4	Electrical resistance	Type C castors	**4.4**
5.5	Contact pressure	all	**4.10**
5.8	Brake performance	Type U castors (first test)	**4.11**
5.9	Dynamic	all	**4.13**
5.10	Long distance running	all	**4.14**
5.11	Rolling resistance	all	**4.15**
5.12	Swivel resistance	all	**4.16**
5.8	Brake performance	Type U castors (second test)	**4.11**
5.6	Stem retention	all	**4.17**
5.7	Static load performance	all	**4.9**

5.3 Impact performance

5.3.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.12.

5.3.2 Test values

The test values shall be as listed in Table 3.

Table 3

Symbol	Value	Description
m	5 kg	free falling mass
h_2	200 mm	drop height

5.3.3 Tolerances

The tolerances shall be as shown in Table 4.

Table 4

Symbol	Unit	Tolerance	
		Acceptable	Unit
m	kg	$^{+2\ \%}_{0}$	kg
h_2	mm	$^{+3}_{0}$	mm

5.3.4 Acceptance criteria

No part of a castor shall become detached during the tests. On completion of the test, the rolling, pivoting or braking performance shall be not impaired.

5.4 Electrical resistance test

5.4.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.4.

5.4.2 Test values

The test values shall be as listed in Table 5.

Table 5

Symbol	Value	Description
F_{max}	variable	load capacity
F_{17}	5 % to 10 % of F_{max}	test load
R	variable	electrical resistance

5.4.3 Tolerances

The tolerance shall be as shown in Table 6.

Table 6

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_{17}	N	$^{+2\ \%}_{0}$	N

5.4.4 Acceptance criteria

The resistance R of the sample tested shall be

— $R \leqslant 10^5\ \Omega$ for conductive castors or wheels, and

— $10^5\ \Omega < R \leqslant 10^7\ \Omega$ for antistatic castors or wheels.

5.5 Contact pressure

5.5.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.10.

5.5.2 Test values

The test values shall be as listed in Table 7.

Table 7

Symbol	Value	Description
F_2	325 N	test load
t_{y1}	24 h	time of application of the load

5.5.3 Tolerances

The tolerances shall be as shown in Table 8.

Table 8

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_2	N	$^{+2\ \%}_{0}$	N
t_{y1}	h	$^{+15}_{0}$	min

5.5.4 Acceptance criteria

5.5.4.1 Type H castors

The average contact pressure exerted by the wheels on the test surface shall not be less than 10 N/mm^2.

5.5.4.2 Type W castors

The average contact pressure exerted by the wheels on the test surface shall not be less than 3 N/mm^2 and shall not be more than 5 N/mm^2.

5.6 Stem retention

5.6.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.17.

5.6.2 Test values

The test value shall be as listed in Table 9.

Table 9

Symbol	Value	Description
F_{min}	50 N	minimum pull-out force

5.6.3 Acceptance criteria

The force required to remove the stem from the castor shall be greater than F_{min}.

5.7 Static load performance

5.7.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.9.

5.7.2 Test values

The test values shall be as listed in Table 10.

Table 10

Symbol	Value	Description
F_6	800 N	test load
t_{y1}	24 h	time of application of the load
t_{y2}	24 h	elapsed time prior to inspection

5.7.3 Tolerances

The tolerances shall be as shown in Table 11.

Table 11

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_6	N	$^{+2\ \%}_{0}$	N
t_{y1}	h	$^{+15}_{0}$	min
t_{y2}	h	± 1	h

5.7.4 Acceptance criteria

Wheel deformation measured after a time t_{y2} shall not exceed 3 % of the wheel diameter. On completion of the test, the rolling, pivoting or braking performance shall not be impaired.

5.8 Brake performance of Type U castors

5.8.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.11.

5.8.2 Test values

The test values shall be as listed in Table 12.

Table 12

Symbol	Value	Description
F_1	60 N/120 N/150 N (progressive)	test load (including frame)
v_3	50 mm/s	travel speed

5.8.3 Tolerances

The tolerances shall be as shown in Table 13.

Table 13

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_1	N	$^{+2\ \%}_{0}$	N
v_3	mm/s	$\pm$ 5 %	mm/s

5.8.4 Acceptance criteria

For each test load (using three castors), the minimum horizontal tractive force shall be

— for Type H castors (F_{w1}): 11 N, and

— for Type W castors (F_{w2}): 9 N.

5.9 Dynamic test

5.9.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.13.

5.9.2 Test values

The test values shall be as listed in Table 14.

Table 14

Symbol	Value for Type H castor	Value for Type W castor	Description
F_7	300 N	300 N	test load (per castor)
h_1	2 mm	3 mm	height of obstacles
n_{r2}	5 000 cycles	30 000 cycles	number of cycles
t_{z1}	3 min	3 min	running period
t_{z2}	2 min	2 min	pause
f_z	6,8 cycles/min	6,8 cycles/min	frequency

5.9.3 Tolerances

The tolerances shall be as shown in Table 15.

Table 15

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_7	N	$^{+2\ \%}_{0}$	N
h_1	mm	$^{0}_{-5\ \%}$	mm
n_{r2}	—	$^{+1\ \%}_{0}$	—
t_{z1}	min	$\pm$ 10	s
t_{z2}	min	$\pm$ 10	s
f_z	cycles/min	$\pm$ 3 %	cycles/min

5.9.4 Acceptance criteria

No castor or a part of a castor shall become detached during the tests. Each castor shall still be capable of carrying out its function at the end of the test programme. On completion of the test, the rolling, pivoting or braking performance shall not be impaired.

5.10 Long distance running

5.10.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.14.

5.10.2 Test values

The test values shall be as listed in Table 16.

Table 16

Symbol	Values for Type H castors	Values for Type W castors	Description
F_7	300 N	300 N	test load (per castor)
n_{r2}	70 000 cycles	20 000 cycles	number of cycles
f_z	6,8 cycles/min	6,8 cycles/min	frequency

5.10.3 Tolerances

The tolerances shall be as shown in Table 17.

Table 17

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_7	kg	$^{+2\ \%}_{0}$	kg
n_{r2}	—	$^{+15}_{0}$	—
f_z	cycles/min	$\pm$ 3 %	cycles/min

5.10.4 Acceptance criteria

No castor or a part of a castor shall become detached during the tests. Each castor shall still be capable of carrying out its function at the end of the test programme. On completion of the test, the rolling, pivoting or braking performance shall not be impaired.

5.11 Rolling resistance

5.11.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.15.

5.11.2 Test values

The test values shall be as listed in Table 18.

Table 18

Symbol	Value	Description
F_1	300 N/600 N/900 N (progressive)	test load (including frame)
v_3	50 mm/s	travel speed

5.11.3 Tolerances

The tolerances shall be as shown in Table 19.

Table 19

Symbol	Unit	Tolerance	
		Acceptable	Unit
F_1	N	$^{+2\ \%}_{0}$	N
v_3	mm/s	$\pm$ 5 %	mm/s

5.11.4 Acceptance criteria

For each test load, the horizontal tractive force F_{w3} shall not exceed 15 % of F_1.

5.12 Swivel resistance

5.12.1 Test objectives, apparatus and procedures

These shall be as specified in ISO 22878:2004, 4.16.

5.12.2 Test values

The test values shall be as listed in Table 20.

Table 20

Symbol	Value	Description
F_1	100 N/200 N/300 N (progressive)	test load (including frame)
v_3	50 mm/s	travel speed